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Crookes says, indeed, "that the atoms are not eternal in existence, but share with all other created beings the attributes of decay and death." They cannot be dissolved into nothing, however, and the only condition they could assume would be that of the formless fluid from which they originally emerged. If this were to happen, matter as we know it would cease to exist, and material or three-dimensional space would with it disappear.

Such a change as is here supposed would be one of pure negation, that is, it would be the negation of all material existence. And yet it would not be absolute negation. It might be described as the absence of position. Every past stage of evolution is negative to that which immediately succeeds it, and yet it is positive to that which has gone before; so that if we go back to the beginning of evolution, the earliest negation is the most real of all existences, because it is that from which all other existence has been derived. Thus formed matter in ceasing to exist as such, and in being resolved again into the primitive formless fluid, would yet continue to exist in a negative state, that is, in its original formless condition, as to the nature of which we can frame no clear idea, beyond that it would be non-material and invisible. Probably we should be justified in considering it the same as the ether.

The existence of the ether is as real as that of formed matter, judging from the phenomena of light, and for that we know there may be ethereal existences which are not subject to the laws which affect that matter. It may be, moreover, that the ether furnishes the link which unites individuals so as to form "genetic or race relationships," and that it conceals the world of spirits, if such exists, from material gaze. The race unity which Professor Hall refers to may, indeed, be conceived of as consistent with, and as even requiring the continued existence of, individuals; just as the existence of a wire depends on that of its constituent molecules. Thus the death of an organism may include a change, unless it be simply a *return*, to a state of immateriality and, therefore, of invisibility. If so, such a negative existence may be the end of all things, material as well as organic; and, since complete change of form often, as in the case of destruction by fire, takes place rapidly, there may be conditions under which, instead of as Professor Hall imagines a plane being stepping out of our space and re-entering it again, matter may suddenly become invisible, that is, be reduced to a state of formless fluid, and again become visible. Under such a condition, all the phenomena which it is supposed the existence of four-fold space would render possible, could be equally well produced without it. The erratic nature of ghosts even would be explainable on the assumption that ethereal existences have the power, under special circumstances, of making use of the physical forces so as to render themselves visible. This is, however, beside the real question, which is the possibility of a state of relatively negative existence, which, although invisible to us, is as real as that on the material plane.

C. STANILAND WAKE,

349 North Clark St., Chicago, June 1.

The Possibility of a Realization of Four-Fold Space.

DR. HALL's argument for this possibility (*Science*, May 13, 1892) turns upon two other possibilities: first, upon the possibility of building up the conception of this kind of space from that which we already know; and, second, on the possibility of making such a conception so perfect that it may fairly be said to be realized. In support of the first he instances the visual perception of space in which we are supposed to get three fold space by inference from a plane image. Many psychologists, however, contend that such a constructive inference is quite impossible, and others believe that it is only made possible in the case of vision by the aid of touch. Even those that admit a construction of the sort required, can hardly deny that it occurs in the very beginning of babyhood, a fact that points to a racial rather than an individual acquisition. It appears, therefore, to be extremely doubtful whether Dr. Hall could get a four fold space conception built up in a single generation, if at all; that is, if it is to be realized in anything like the degree in which we realize three-fold space.

If, however, by realization is meant only a tolerably complete

knowledge about four-fold space,—such, for example, as a deaf physicist could get of sound,—it may be possible to realize it; and Dr. Hall has undoubtedly taken the right road. But knowledge about a thing seems to come somewhat short of realization of it. Some sensory element is also required, and especially verification by touch, which is the sense of last appeal in cases of doubtful reality. Dr. Hall's models would appear to this sense as unquestionably three-fold as a perspective drawing would appear plane.

In regard to the benefits of a full knowledge of four-fold space, Dr. Hall should not allow himself to hope too much. A really clever and elusive ghost would never stop at four-dimensions, but would surely lead him, Will o' the-wisp fashion, through all the series of *n* dimensions.

EDMUND C. SANFORD.

Clark University, Worcester, Mass., June 6.

Eskimo Throwing-Sticks.

IN my pamphlet on the Eskimo Throwing-Sticks I drew attention to the fact that they are all right-handed save two from the Alaskan Peninsula and that neighborhood. I also mentioned two specimens afterwards described by Ensign Niblack from the Tlingit area in south-eastern Alaska. I neglected to mention that they are ambidextrous, and so is a beautiful specimen from the Vancouver collection, figured by Mr. Charles H. Read in the *Journal of the Anthropological Institute* (Vol. XXI., pl. xi.), bilaterally symmetrical and, doubtless, ambidextrous. In British Columbia and Washington the long-handled fish-spear is ambidextrous, and has two finger-notches on the end, answering to, if not derived from, the form further south. Mr. Read's specimen from Santa Barbara, Cal., is an abbreviated specimen of like form to one lately recovered from Lake Patzcuaro, Mex., by Captain John G. Bourke, U.S.A., suitable for either hand. Looking over the interesting pamphlets of Mrs. Nuttall and Messieurs Stolpe, Uhle, Bahnson, Seler, and de Mortellet, I find most of the spear-throwers or throwing-sticks adapted to either hand. The ornamentation throws a considerable amount of uncertainty over the elaborate forms, but, omitting the Eskimo examples, all other spear-throwers appear to be ambidextrous. Indeed, I should like to inquire whether outside of the Eskimo area any American aborigines had apparatus that would not fit either hand.

Hasty conclusions are dangerous, but we may be allowed to say that the development of a purely right handed implement points to a southern origin for the original invention. At any rate, the atlatl is assuming an enviable importance in comparative technography. While upon the subject I should like to draw attention to the Mexican artist's fashion of pulling certain parts of a solid body into the foreground, as in the heart-shaped finger-pocket or grip on the bottom of the atlatl, always exhibited on the side. Notice is also called to the fashion of shortening objects to get them into a picture; for example, in many cases a harpoon with a shaft ten feet long is represented with all its parts in as many inches.

O. T. MASON.

Washington, D.C., June 7.

AMONG THE PUBLISHERS.

THE Scientific Publishing Company, 27 Park Place, New York, have in press Dr. Endlich's "Manual of Qualitative Blowpipe Analysis."

— William R. Jenkins, New York, has just issued "Parasites and Parasitic Diseases of the Domesticated Animals," by L. G. Neumann, professor at the National Veterinary School of Toulouse, translated and edited by George Fleming.

— Harper & Brothers have nearly ready a book which doubtless will provoke no little discussion and controversy. It is entitled "The Puritan in Holland, England, and America," by Douglas Campbell, who claims that the last word regarding the Puritan settlers of New England has not yet been written, and that many of the prevalent ideas concerning the earlier influences upon the political, social, and religious life of the American people are susceptible of revision.